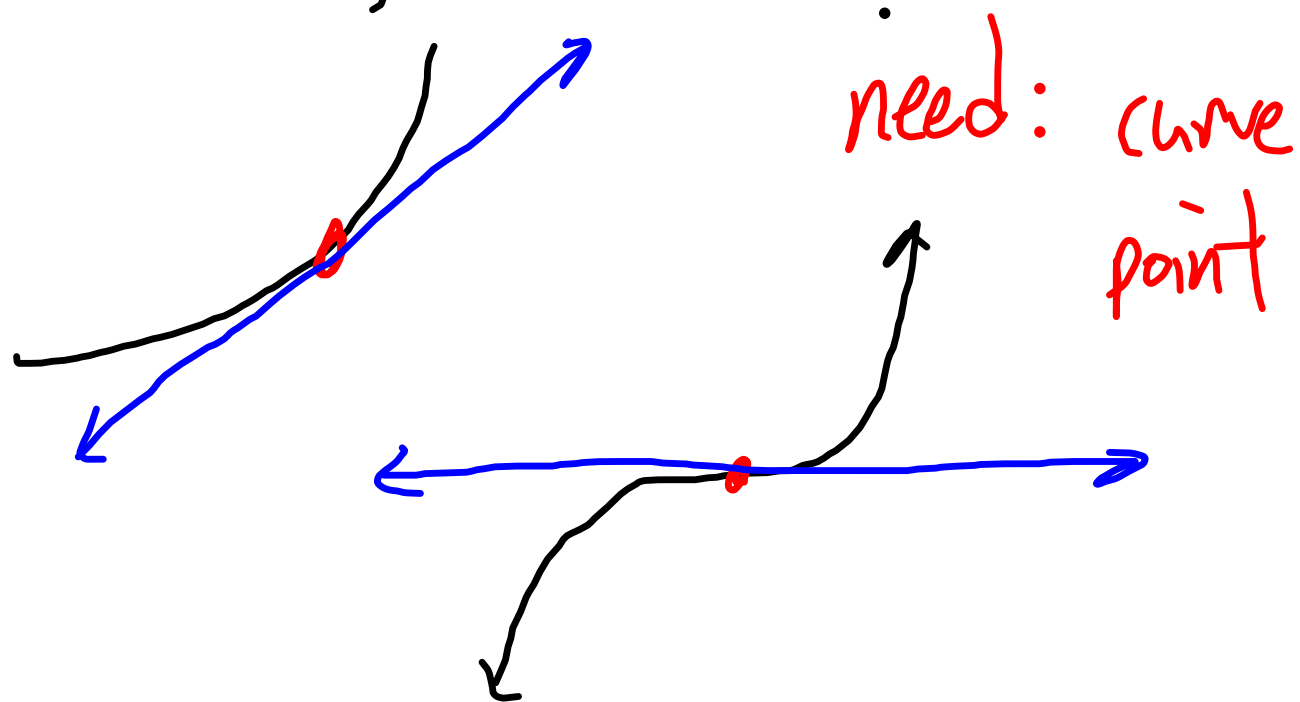
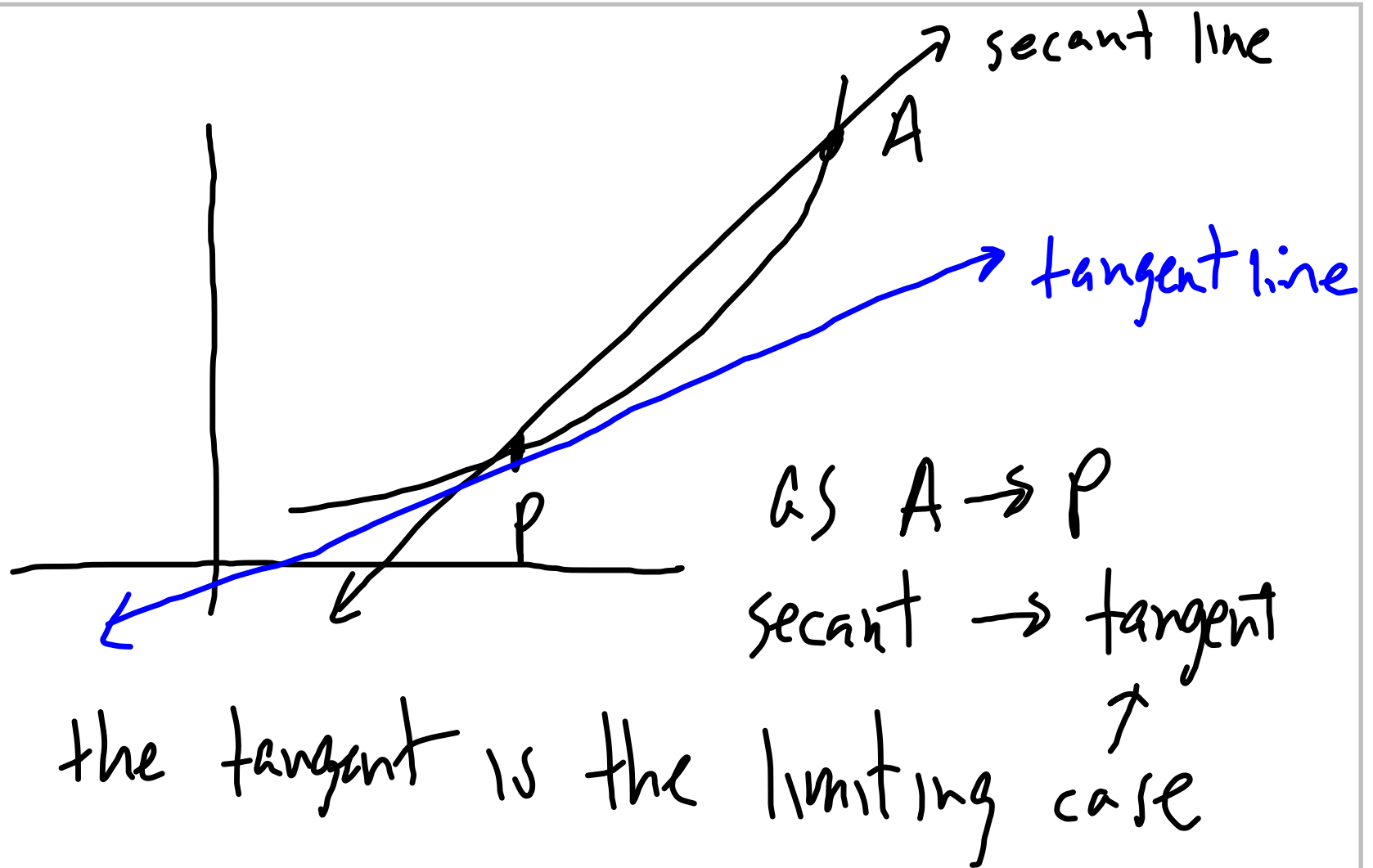
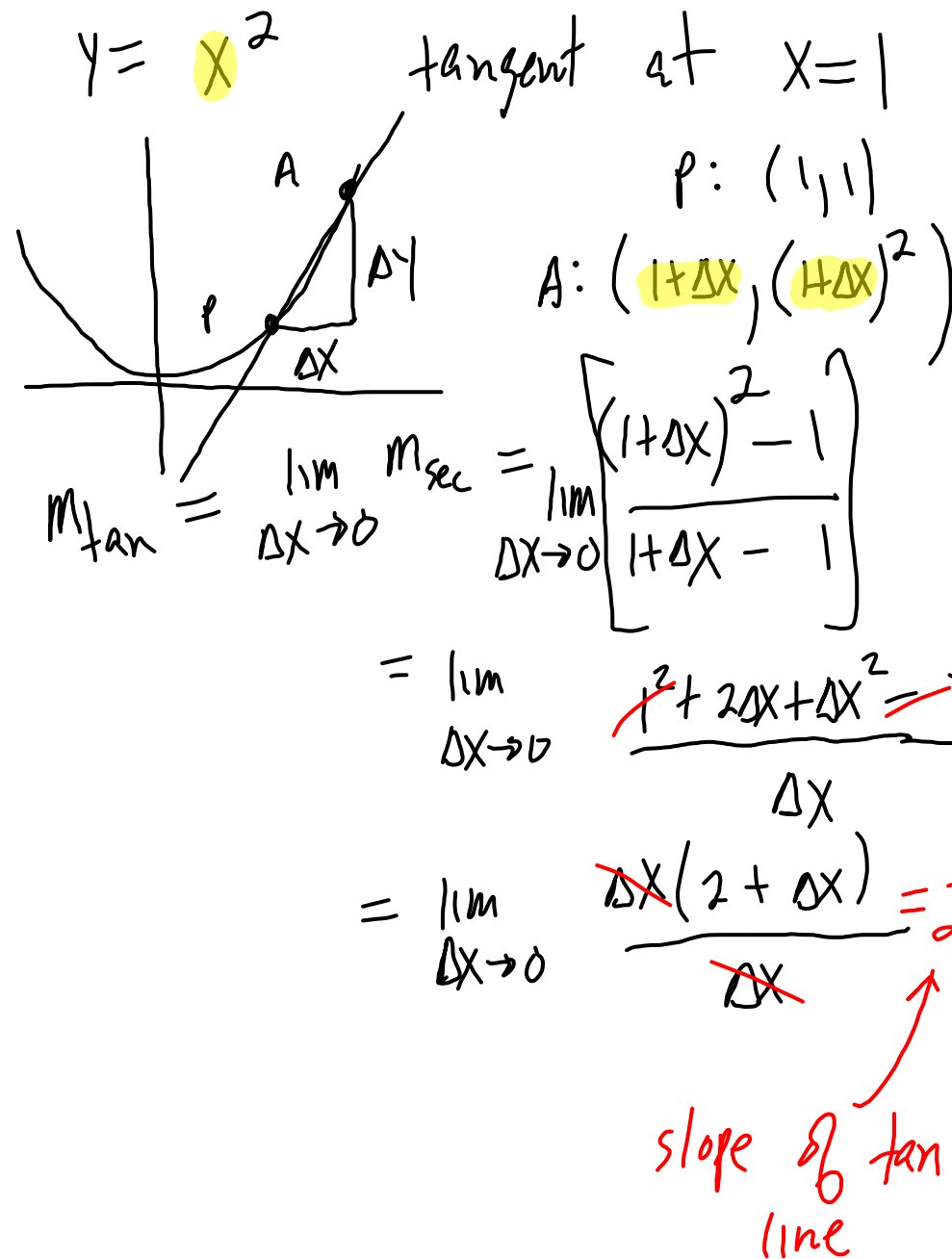


2.4 b slope of a tangent line
instantaneous rates of change
what is a tangent line?







equation of tan line

slope = 2 point (1,1)

$$y = 2(x - 1) + 1$$

normal line $m = -\frac{1}{2}$

$$y = -\frac{1}{2}(x - 1) + 1$$

$$f(x) = x^2$$

$$x_1 = -2 \quad y_1 = 4$$

$$x_2 = -2 + \Delta x$$

$$y_2 = f(x_2)$$

$$\lim_{\Delta x \rightarrow 0}$$

$$\frac{(-2 + \Delta x)^2 - 4}{(-2 + \Delta x) - (-2)}$$

$$\lim_{\Delta x \rightarrow 0}$$

$$\frac{4 - 4\Delta x + \Delta x^2 - 4}{-2 + \Delta x + 2}$$

$$\lim_{\Delta x \rightarrow 0}$$

$$\frac{-4\Delta x + \Delta x^2}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0}$$

$$\frac{\cancel{\Delta x}(-4 + \Delta x)}{\cancel{\Delta x}}$$

$$= -4 \leftarrow \text{slope of tan}$$

tan line
 $y = -4(x + 2) + 4$
 normal
 $y = \frac{1}{4}(x + 2) + 4$

24. How fast = slope of tan

$$f(x) = 3x^2$$

$$x_1 = 10 \quad y_1 = 300$$

$$x_2 = 10 + \Delta x$$

$$y_2 = 3(10 + \Delta x)^2$$

ex slope of $y = \frac{1}{x-1}$ at $x_1 = 2$
11 $y_1 = 1$

common den

$$x_2 = 2 + \Delta x$$

slope:

$\lim_{\Delta x \rightarrow 0}$

$$\frac{\frac{1}{1+\Delta x} - 1 \frac{(1+\Delta x)}{1+\Delta x}}{\Delta x}$$

$$y_2 = \frac{1}{2+\Delta x-1} = \frac{1}{1+\Delta x}$$